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July 27, 1998

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OFFICE OF THE SECRETARY

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Ms. Magalie Salas
Secretary
Federal Communications Commission
1919 M Street, N.W.
Washington, D.C. 20554

**Re: Sensormatic Electronics Corporation's Comments in
Response to Notice of Inquiry, ET Docket No. 98-80,
FCC 98-102, Released June 8, 1998**

Dear Ms. Salas:

On behalf of Sensormatic Electronics Corporation, transmitted herewith is an original and nine copies of the Comments of Sensormatic Electronics Corporation in the above-referenced docket. Please date-stamp the return copy and return it to the courier delivering this package.

Please contact the undersigned if there are any questions regarding this matter.

Sincerely,



Christopher Sova

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BEFORE THE
Federal Communications Commission
WASHINGTON, D.C. 20554

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**FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY**

In the Matter of)
)
NOTICE OF INQUIRY)
)
1998 Biennial Regulatory Review -)
Conducted Emissions Limits Below 30 MHz)
for Equipment Regulated Under Parts 15)
and 18 of the Commission's Rules)

ET Docket No. 98-80

To: The Commission

COMMENTS OF
SENSORMATIC ELECTRONICS CORPORATION

Sensormatic Electronics Corporation ("Sensormatic"), by its attorneys, hereby submits the following comments in response to the Notice of Inquiry, FCC 98-102, released June 8, 1998 ("NOP") in the above-captioned proceeding. Sensormatic is a leading worldwide designer, manufacturer, and marketer of electronic security, sensing and tracking systems for retail stores, and sells, installs and maintains electronic article surveillance systems operating in the United States under the Part 15 Rules on various frequencies, including frequencies in the bands below 30 MHz.

As a general proposition, Sensormatic agrees with the Commission that conducted emissions limits remain necessary for controlling interference to radio services operating below 30 MHz. Sensormatic suggests that the Part 15 and Part 18 Rules regarding conducted emissions limits need to be updated to better protect against the harmful interference caused by the recent proliferation in the use of a category of devices known as Variable Frequency Drives or Variable

Speed Drives (collectively, “VFDs”).

Emissions from Variable Frequency Drives Should Be Regulated

Attached hereto is the Technical Statement of Donald J. Umbdenstock, Project Leader for Compliance Engineering of Sensormatic (the “Umbdenstock Statement”), which addresses several of the specific questions posed by the Commission in the NOI. These comments summarize several of the key points made in the Umbdenstock Statement.

The conducted emissions limits specified under Part 15 were last reviewed comprehensively in 1989, and the limits specified under Part 18 were last reviewed comprehensively in 1985. Under the current rules, most products that are subject to conducted emissions limits have limits imposed in the range of 450 kHz to 30 MHz, with exceptions being induction cooking ranges and ultrasonic equipment, which are subject to conducted emissions limits beginning at 10 kHz because they generate high levels of emissions even at low frequencies. However, as explained in the Umbdenstock Statement, since the last revisions to Parts 15 and 18, a new class of products has been introduced, known collectively as VFDs, which provide efficiencies in energy consumption when used in conjunction with such end uses as air handlers and elevators. Because VFDs operate below 450 kHz where no applicable regulations exist, VFDs can cause interference. The Part 15 and Part 18 rules currently in effect do not regulate the conducted emissions caused by VFDs operated at low frequencies, and therefore, such interference continues unmitigated. Because of the efficiency provided by VFDs, the use of VFDs in industrial settings can be expected to continue to expand, along with the attendant interference. Sensormatic suggests that, like induction cooking ranges and ultrasonic equipment, VFD devices should be added as a new category whose conducted emissions are subject to regulation under

Part 18 of the Commission's Rules.

VFDs act as AC-AC converters, accepting power from electric utility lines, and continuously adjusting the power delivery to motors as the load varies, thereby reducing power consumption. *See Umbdenstock Statement at Page 1, Item 10, Bullet 3.* Whereas previous motor controllers were low frequency devices operating at around 4 kHz, the new VFDs operate using pulse width modulation over varying frequencies of up to 16 kHz with associated harmonics, and at a power level which is typically much higher than that used by digital devices regulated under Part 15. *Id.* Because VFDs operate at frequencies below 450 kHz, however, the conducted emission limits found under 47 C.F.R. § 15.107 are not effective for VFDs. At this higher level of power, interference can occur because the emissions are conducted onto extensive building wiring which acts as an antenna, jamming systems such as carrier current and security devices. Sensormatic has documented situations where a VFD installed in one retail store has caused interference to a security system installed and operating in an adjacent store. *Id.* at Page 2, Item 10, Bullet 3.

Emissions resulting from the operation of VFDs can be reduced to acceptable levels through the installation of power input filtering devices attached to the interfering equipment. Such filters are expensive, and anywhere from 6 to 70 filters may be required for each business location in which an RF security device is installed. The cost of providing such filters is not necessarily being borne at present by the manufacturer or operator of the interference-causing VFD, but rather, the cost is being borne by the innocent party suffering the interference. Sensormatic therefore suggests that the conducted emissions rules of Part 18 be expanded to include VFDs operating on frequencies as low as 10 kHz. *Id.* In this way, the level of

interference caused by VFDs can be controlled, and the cost of reducing the conducted emissions will be rightfully borne by the manufacturer of the VFD or the equipment containing a VFD.


Such a result is consistent with 47 C.F.R. §18.109, which requires that equipment regulated under Part 18 be designed and constructed in accordance with good engineering practice with sufficient shielding and filtering to provide adequate suppression of emissions, and 47 C.F.R. § 18.111(b), which requires that operators of equipment regulated under Part 18 take whatever steps may be necessary in order to eliminate harmful interference.

Conclusion

For the reasons set forth above and in the Umbdenstock Statement, Sensormatic respectfully suggests that the Commission consider regulating the emissions from VFDs operating on frequencies as low as 10 kHz under Part 18 of its Rules, so that the harmful interference to Part 15 devices can be mitigated.

Respectfully submitted,

**SENSORMATIC ELECTRONICS
CORPORATION**

By: 
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Dated: July 27, 1998

Its Attorneys

**1998 Biennial Regulatory Review --
Conducted Emissions Limits Below 30 MHz
for Equipment Regulated Under Parts 15
and 18 of the Commission's Rules.**

Technical Statement of Sensormatic Electronics Corporation

Item 9, bullet:

1. Are the Part 15 and 18 conducted emissions limits still necessary?

Yes, though consideration should be given to the record of interference complaints at the FCC.

Item 10, bullet:

1. Are the existing Part 15 and 18 conducted emissions limits effective in controlling interference to services operating below 30 MHz?

Not entirely. See Item 10, bullet 3 and Item 11, bullet 4.

3. Have there been changes in the technologies used by services below 30 MHz that increase or decrease the need for interference protection? If so, describe the technology changes and how they should be taken into account in adjusting the conducted emissions limits.

Yes. There is a need to increase the interference protection from a new class of products.

A class of products known as Variable Frequency Drives (VFDs) or Variable Speed Drives (VSDs), and perhaps other devices with similar characteristics (referred to collectively herein as "VFDs"), have recently been enhanced to provide improved efficiencies in the application of electric power utilities to motors that drive such equipment as air handlers and elevators. VFDs are a type of ac-ac converter that continuously adjust the power delivery to motors as the load varies. The variable power control reduces power consumption.

In the past, motor controllers were low frequency devices operating around 4 kHz and were not subject to FCC rules. A new motor controller technology has emerged in the last few years (since about 1994) employing pulse width modulation and higher frequency operation with signals of up to 16 kHz and associated harmonics. The higher output frequency enables quieter operation of the motor.

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An unintended consequence associated with these improvements in efficiency and noise control was the introduction of interference not previously experienced. The signals conducted onto the public electric utility are also radiated by lengthy building wiring, which acts as an effective antenna. These signals create harmful interference. For example, when the signals happen to fall on the receiver operating frequencies of some electronic security devices, the security systems are jammed (harmful interference). The conducted emissions thus become the source of interference both directly and indirectly (conducted interference and radiated interference).

The solution to the interference problem currently consists of providing an expensive power input filter for the VFD. The number of filters required ranges from a low of 6 per business location to a high of 70 filters per business location. Interestingly, VFD interference is not just a local phenomenon. A VFD installed in one business location has caused problems to the equipment powered and operating in an adjacent business.

The cost of resolving the problem has been borne by the innocent party suffering the interference. The supplier of the victim equipment has born the cost of mitigation instead of the supplier of the offending equipment. This cost has been in the form of purchasing expensive filters to be connected to VFDs to allow the security equipment to operate as intended. The cost of each filter is approaching the cost of some security systems. The course of action whereby Sensormatic provided the filters connected to VFD equipment has occurred at least 12 times in various locations around the country since 1995.

Since the frequencies generated are higher than 9 kHz, the offending VFD products fall within the scope of the FCC rules such as Part 15 or Part 18. The rules do not allow Part 15 or Part 18 devices to cause harmful interference. The VFDs are, in fact, causing harmful interference to security equipment.

It appears that the current Part 15 rules are not appropriate for VFDs, as limits for conducted emissions are only specified in the frequency range between 450 kHz and 30 MHz, not down to 10 kHz. The frequency range causing interference currently has no limits specified. For this reason, Sensormatic proposes that systems such as VFDs should be identified as Part 18 equipment, and limits should be established with frequencies down to 10 kilohertz, as are limits for induction cooking ranges and ultrasonic equipment.

Item 11, bullet:

- 4. Are there specific types of products that should be subject to different conducted emissions standards? Are there certain types of products that should be subject to conducted emissions limits that are not currently required to meet such limits?**

The class of products collectively defined as VFDs (see Item 10, bullet 3 response above) should have unique conducted emissions limits, even in commercial or other non-residential areas. Currently there are no conducted emissions limits in the frequency ranges that have been known to cause interference. These products can cause interference not only below 30 MHz, but also below 450 kHz. These devices should have conducted emissions limits as low as 10 kHz. The logical place for these devices would be under Part 18, where other devices have limits at frequencies down to 10 kHz (induction cooking ranges and ultrasonic equipment).

Submitted by

A handwritten signature in black ink, appearing to read "D. J. Umbdenstock", is written over a horizontal line.

Donald J. Umbdenstock

Project Leader, Corporate Compliance
Sensormatic Electronics Corporation

July 24, 1998